

Progress Report

January 23, 2007

PROPOSAL TO THE FEDERAL HIGHWAY ADMINISTRATION

TASK ORDER DTFH61-06-T-70006

FOR THE DEVELOPMENT OF
GUIDE SPECIFICATIONS FOR BRIDGES VULNERABLE TO COASTAL STORMS
AND
HANDBOOK OF RETROFIT OPTIONS FOR BRIDGES VULNERABLE TO
COASTAL STORMS

LIMITED USE DOCUMENT

This document shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this document shall also be strictly complied with.

by

Modjeski and Masters, Inc.

with

Moffatt and Nichol, Inc.
Ocean Engineering Associates, Inc.
D'Appolonia, Inc.
Dr. Dennis R. Mertz

INTRODUCTION

We received Notice to Proceed on this Work Order on August 14, 2006.

The Kick-off meeting finally occurred Dec. 5th and 6th and was extensively covered in our November Progress Report. It was decided to hold that Progress Report until after the kick off meeting because of the significance of this first face-to-face interaction with the BWTF. This report covers work in December that occurred after the kick off meeting. December was effectively a short month due to holidays and associated vacations. We had asked to be relieved of the requirement for this progress report, but on January 14th we were advised by Mr. Perfetti, the new Chair of the Bridge Wave Task Force (BWTF), that this report was required.

TASK 1 – MEETINGS

No new meetings with the BWTF took place in this reporting period.

TASK 2 – REVIEW, SUMMARIZE, AND AUGMENT LITERATURE

A request for information was sent to all of the coastal states and to a variety of other agencies identified by the Project Team. No new responses were received in this period. It is safe to assume that all who intend to reply have now done so.

We continue to identify new literature, but at a slower rate. One potentially significant piece of information was provided by Dr. William Allsop of H.R. Wallingford. It was reported at the kick off meeting that Mr. John Headland, a Principal of Moffat and Nichol, who was in the U.K. on company business was meeting with Dr. Allsop that week to try to gain access to information on a new method for computing wave forces of piers and jetties. We did receive a summary late in December but not supporting data which was in a second paper being considered for publication. We hope to receive the second paper in January. What we did receive is sufficient to enable us to add results to our comparisons of wave force calculations in Task 4, which will be done in January.

We have been trying to estimate the apparent resistance of all spans on the I-10 Escambia Bay and Lake Pontchartrain bridges. The results are extremely sensitive to assumptions necessary to make the calculations and the assumed buoyancy effects as they relate to the amount of available horizontal friction.

TASK 3 – REVIEW AND SUPPLEMENT ONGOING FORCE STUDIES

The BWTF provided some feedback on the work program illustrated in the proposed wave force summary spreadsheet which was discussed at the kick off meeting. We will add the additional cases to show the variation of force with a one foot change in Y_c . Preparations to add these cases were underway in December.

During the kick off meeting there was a demonstration at the U. of F. wave tank. Although this is an FDOT project, the testing methods and experiment regime were discussed. There was a desire to try to capture some data on slamming. The wave tank was taken out of service to the rest of December to reinforce (stiffen) the specimen support assembly to remove some of its tendency to vibrate during the tests.

TASK 4 – COMPILE AND CATALOG RETROFIT OPTIONS

We have received some feedback on the draft of retrofit concepts at the kick off meeting which resulted in the following work::

- A note was added to the pier retrofit that involves FRP wrap. The note indicates that the possibility of corrosion due to entrapment of moisture should be investigated.
- A note was added to the retrofit involving deck vents. The note indicates that water spouting through the deck vents is possible during periods of high water and that precautions should be taken to protect motorists and pedestrians.
- Several retrofits involving vents that do not pass through the deck were added. These include diaphragm vents, beam and haunch vents, replacement of solid diaphragms with steel frame diaphragms, chimney type pipe vents, and horizontal formed vents in the deck.
- A retrofit involving an artificial reef to produce depth limited waves was added.
- A retrofit involving the use of sacrificial spans (or stock piling of spans) was added.
- The orientation of hooks in shear blocks was changed.

Two comments that have not yet been addressed are the inclusion of gates for closing a bridge and review of the retrofits for constructability.

We are rapidly running out to reasonable additional concepts. We are aware that engineers from FDOT may be looking at some issues related to our retrofit concepts as part of an instate research project, and we will contact them to share information.

TASK 5 – PERFORM ANALYTICAL STUDY OF RETROFIT OPTIONS

No progress to-date.

TASK 6 – DEVELOP A GUIDE SPECIFICATION AND A RETROFIT HANDBOOK FOR ADOPTION BY AASHTO

TASK 6A - GUIDE SPECIFICATION

We continue to explore ways to develop the three level approach to wave force calculations that was discussed in earlier progress reports. This focuses on how to estimate the storm water level (SWL) and the design wave height above the SWL and therefore the sources of necessary data. The respective roles of the bridge engineer and the coastal engineer have to be established. We continue to review literature related to statistical and reliability analyses used in the design of other engineered coastal structures, primarily breakwaters and oil platforms.

TASK 6B - RETROFIT HANDBOOK

See above.

TASK 7 – DEVELOP FINAL REPORT AND RECOMMENDATIONS FOR FURTHER STUDIES

No progress

TASK 8 – PREPARE EXECUTIVE SUMMARY AND PRESENTATION MATERIALS

No progress

FUTURE WORK – NEXT MONTH

1. We will continue to monitor Dr. Sheppard's experimental work as it is pivotal to selection of a method to calculate wave forces.
3. We will populate the wave force summary spreadsheet for the four calculations methods previously agreed upon.
3. We will try to finish the Task 2 and 3 deliverables. Of course, there will probably be additions to the literature search throughout the project as wave forces are a current research topic, but we need to take a practical approach billing these tasks.

4. We will be working on a strawman for design specifications as a way to organize thoughts and focus efforts.
5. We will continue to research the reliability and recurrence issues.
6. We are planning to have an in-team working meeting in mid-January.

SCHEDULE

The schedule previously agreed to is shown below as "Proposed Completion Dates". Since we continue to get new literature and have not finished back calculating resistance of bridges exposed to recent hurricanes this date will slip, perhaps into mid-February. At the moment no other dates are in jeopardy, but some are related to completing of much of the FDOT wave tank tests and the related selection of the wave force calculation method.

TASK	Date shown in Work Plan	PROPOSED COMPLETION DATES
Notice to Proceed	September 1, 2006	
Kickoff Meeting	December 4,5,6, 2006	
Task 2	December 15, 2006	January 15, 2007
Task 3	December 15, 2006	February 28, 2007
Task 4	January 26, 2007	March 31, 2007
Task 5	March 2, 2007	April 15, 2007
Task 6		
50% Draft Specification and Manual	February 15, 2007	April 30, 2007
90% Draft Specification and Manual	May 31, 2007	July 31, 2007
100% Draft Specification and Manual	August 15, 2007	October 15, 2007
Interim Report Tasks 2 to 6	July 15, 2007	September 15, 2007
Task 7		
Draft	June 30, 2007	August 31, 2007
Final	September 15, 2007	November 15, 2007
Task 8 – Executive Summary		
Draft 4 to 6 page summary	June 30, 2007	August 31, 2007
Final 4 to 6 page summary	August 31, 2007	October 31, 2007
Task 8 – 13 hour slides		
Draft	November 30, 2007	January 31, 2008
Final	January 31, 2008	March 31, 2008